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imagery analysis report

Operating Mode of the Soviet TT-EL-01 Telemetry Antenna (S)

Secret

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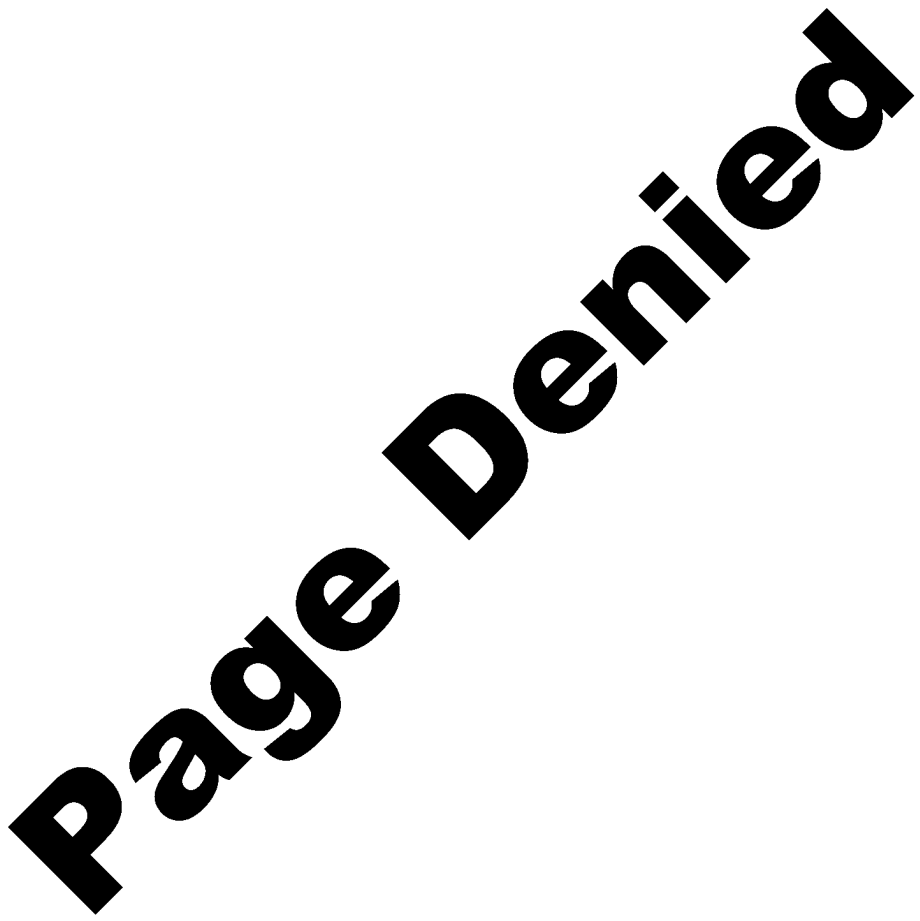

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OPERATING MODE OF THE SOVIET TT-EL-01 TELEMETRY ANTENNA (S)

INTRODUCTION

1. (S/WN) This report discusses the TT-EL-01 telemetry antenna and its operating procedures at three test ranges in the Soviet Union. Satellite imagery acquired from January 1980 through [redacted] was used in the preparation of this report, which includes a location map, conceptual drawings, and six photographs. 25X1 25X1

OVERVIEW

2. (S/WN) The TT-EL-01 is a seven-element telemetry antenna that has been identified at missile test ranges and missile tracking facilities in the Soviet Union (Figure 1). A detailed analysis of this type of antenna suggests that the orientation of the antenna indicates three separate modes: a stowed or resting mode, a calibration mode, and an operating or prelaunch/launch mode. The orientation of the antenna in the prelaunch/launch mode provides a good indication of launch-related activity.

3. (S/WN) Since the first TT-EL-01 antenna was observed at Tyuratam in 1978, 19 TT-EL-01s have been identified (either complete or under construction) at 11 sites (Figure 1 and Table 1). Twelve of the antennas have been identified at test ranges, and seven have been identified at downrange tracking facilities. Primarily because of the frequency of coverage, the best data on the operation of the TT-EL-01 (Figure 2) has been obtained from imagery of test ranges. An accurate assessment of the operating procedures for the TT-EL-01 at Nenoksa, Kapustin Yar, and Plesetsk has resulted.

DISCUSSION

Nenoksa Naval Missile Test Center

4. (S/WN) Because of the high frequency of coverage of the two TT-EL-01 antennas at Nenoksa (approximately 150 times since January 1980), the operating procedures of these antennas can now be understood. These two TT-EL-01s were the first to be positively associated with a single missile system—the SS-NX-20.

5. (S/WN) The antennas were installed on the checkout building for the SS-NX-20 several weeks before the first launch of the missile in January 1980. Unlike some other telemetry antennas, the TT-EL-01 does not face its calibration device when not in use. When the antennas are stowed, they face northward over the White Sea at an approximate azimuth of 0 degrees (Figure 3). On three occasions, the antennas were facing the calibration devices at an approximate azimuth of 320 degrees. Since this orientation is unusual, the antennas were probably being calibrated at those times. On six occasions, the antennas were facing launch facility D at an approximate azimuth of 155 degrees, and SS-NX-20 prelaunch activity was evident. On [redacted] the antennas were reoriented during an SS-NX-20 loading operation (Figure 4). The facility 25X1 25X1

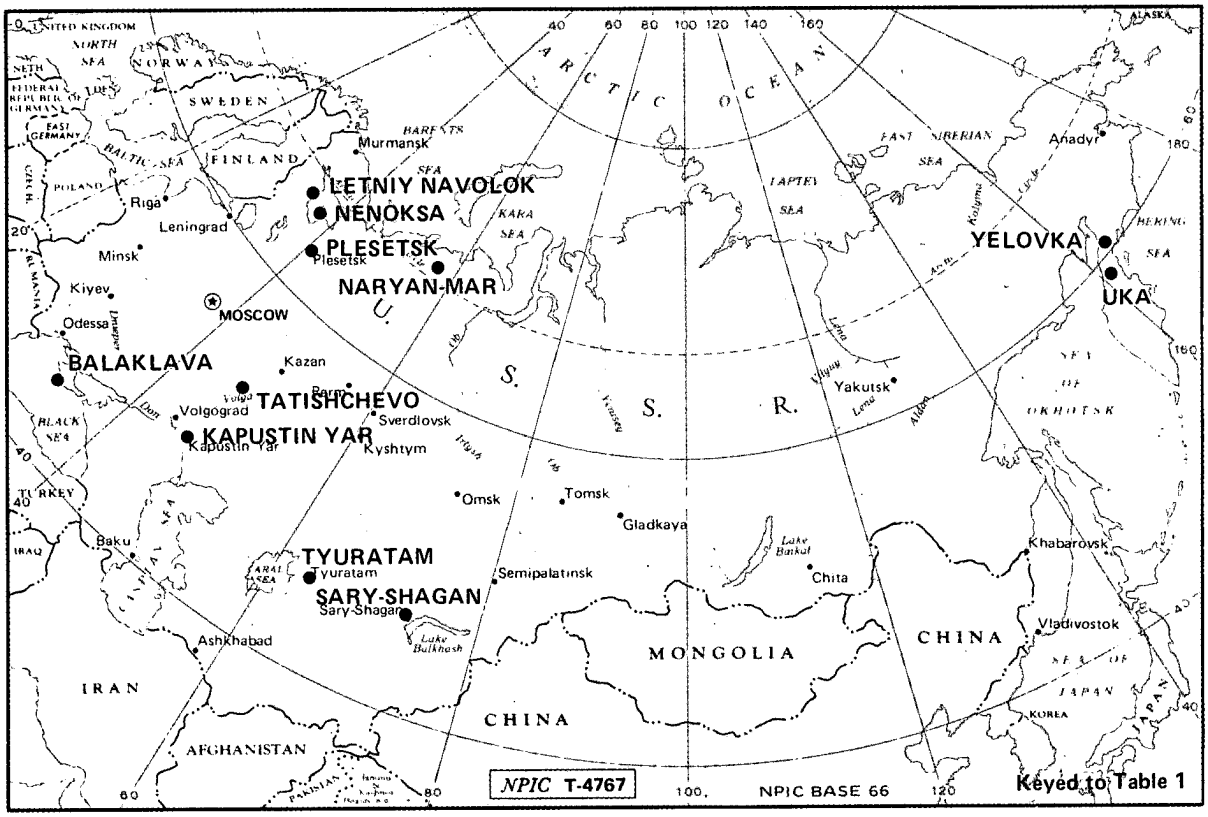

FIGURE 1. LOCATIONS OF TT-EL-01 TELEMETRY ANTENNAS IN THE USSR

was imaged twice on that day. During the three-hour interval between the two coverages, the 19-meter missile railcar was moved to the launch facility, the erector/loader was elevated, and the antennas were reoriented toward the launch facility.

Kapustin Yar Missile Test Center

6. (S/WN) A TT-EL-01 had been installed in the Kapustin Yar Complex C Assembly/Check-out Area by April 1981 (Figure 5). Approximately 30 images of the area have been received since the antenna was installed. Like the two TT-EL-01s at Nenoksa, the antenna does not face its calibration device when not in use. On all coverages acquired through May 1982, the antenna was in its stowed mode facing northward toward the corner of a support building. On [redacted] it was reoriented partially toward the calibration device (Figure 6). 25X1

7. (S/WN) The antenna and its calibration device are in a portion of the Assembly/Checkout Area that has been renovated and separately secured. Vehicles observed in this area have also been at Kapustin Yar Missile Range Test Complex C, Site 2 [redacted], which has been modified for an unidentified program. The presence of the TT-EL-01 and the fact that it is in line of sight with Site 2 suggests that the antenna is probably intended to monitor telemetry from the unidentified program. 25X1

Table 1.
Locations and Descriptions of the TT-EL-01 at Known Facilities in the USSR (Keyed to Figure 1)

This table in its entirety is classified SECRET/WNINTEL

Facility/BE No	Date TT-EL-01 Installed	Antenna No/Mount	Calibration Device No/Mount
Tyuratam ICBM Test Support Facility 3	Aug—Sep 78	1; pedestal	1; telemetry control bldg
[redacted]			25X1
Nenoksa Naval Missile Test Center	Jan 80	2; SLBM checkout bldg	2; both on 1 tower
[redacted]			25X1
Balaklava Missile Test Center	Apr 81	2; pedestal	2; separate towers
	Dec 81	1; pedestal	Uses device in place for antenna installed in Apr 81
[redacted]			25X1
Plesetsk Telemetry/ Tracking Facility	Jun 81	2; new telemetry bldg	1; tower
[redacted]	Mar 82	1; pedestal	1; spt bldg
			25X1
Tatishchevo Launch Control Facility CC	Oct 80— Feb 81	1; transportable	1; tower
[redacted]			25X1
Kapustin Yar Complex C Assembly/Checkout Area	Apr 81	1; pedestal	1; renovated assbly/checkout bldg
[redacted]			25X1
Uka Hen Egg/ Kamchatka Impact Tracking Facility A	Jun 81— Jan 82	1; pedestal	1; tower
	Jan—May 82	1; pedestal	Ukn
[redacted]			25X1
Naryan-Mar Telemetry/Tracking Facility	Sep 81— Feb 82	1; pedestal	1; tower
[redacted]			25X1
Sary-Shagan Missile Test Range-Related Facility 1	Apr 81— Mar 82	1; pedestal	Ukn
	Apr 81	1; ucon; pedestal-installed array being assembled Jun 82	Ukn
[redacted]			25X1
Letniy Navolok Tracking Facility	Feb 82	2; on telemetry bldg	Ukn
[redacted]			25X1
Yelovka Tracking Facility NNE	Jun 81— Mar 82	1; pedestal	Ukn
[redacted]			25X1

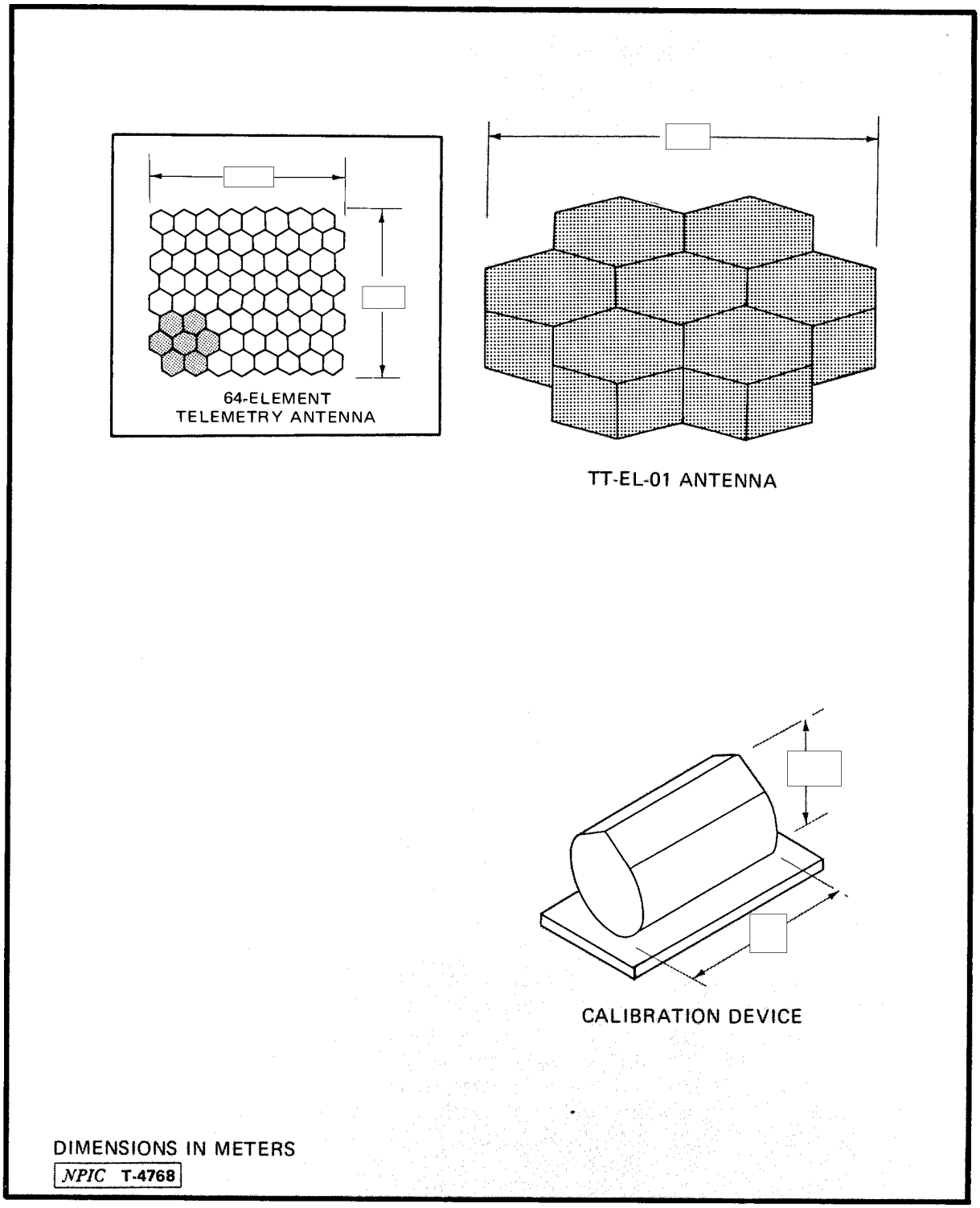

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FIGURE 2. CONCEPTUAL DRAWINGS OF THE TT-EL-01 ANTENNA AND CALIBRATION DEVICE AND THE 64-ELEMENT TELEMETRY ANTENNA

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Plesetsk Missile Test Center

8. (S/WN) Two TT-EL-01s were installed on a new telemetry building in May 1981. A single calibration device to service both was installed on a nearby lattice tower. The antennas normally face the northeast (Figure 7); Plesetsk ICBM Launch Test Sites 23 and 24 [redacted] respectively) are in that general direction. 25X1 25X1 25X1

9. (S/WN) The two TT-EL-01s were facing the calibration device on [ ] 25X1
probably being calibrated. By [ ] they were in their usual position, and a third TT-EL-01 25X1
antenna had been ground-mounted nearby. On [ ] the two building-mounted antennas 25X1
were again facing the calibration device. The ground-mounted antenna appeared to be blocked from the tower-mounted calibration device by the telemetry building. A possible calibration device for the third antenna is mounted on a nearby support building.

10. (S/WN) On [ ] the ground-mounted antenna and one of the building-mounted 25X1
antennas were facing southeast; Plesetsk ICBM Launch Test Sites 22 and 28 [ ] and 25X1
[ ] respectively) are in that direction. On the same day, the second building-mounted 25X1
antenna was being calibrated. On [ ] all three were facing southeast, and on [ ] 25X1
they were facing northeast. On each of the eight coverages acquired from [ ] 25X1
May, the antennas were again facing southeast.

11. (S/WN) Because the usual stowed position of the antennas is in the general direction of Sites 23 and 24, it is difficult to determine when they are actually being used in connection with those sites. However, the reorientation of the antennas toward Sites 22 and 28 suggests that they were being used in connection with those sites on [ ] and from [ ] through [ ] 25X11

Imagery Analyst's Comments

12. (S/WN) Although analysis of the imagery of the TT-EL-01 has yielded a good understanding of the antenna's method of operation at certain facilities, several questions remain unanswered.

13. (S/WN) The TT-EL-01 antennas at Balaklava Missile Test Center are pedestal mounted. The first two were installed at instrumentation sites 1 and 2 in April 1981. Concurrently with the installation of the antennas, clutter screens were erected behind each antenna. Azimuths drawn perpendicular to the screens intersect at a 230-meter-high TV transmitter in Sevastopol, suggesting that the screens are positioned to eliminate interference from the tower. The third antenna was installed at instrumentation site 1 in late 1981. No clutter screen was erected, nor has any subsequent attempt been made to construct one. Since the Soviets do not seem to be concerned about interference with the third antenna, either it operates in a different frequency range or interference from the tower is no longer a problem. The third antenna apparently uses the same calibration device as the screened antenna previously installed at site 1. This suggests a common range of frequencies unless the calibration device operates in more than one frequency.

14. (S/WN) The two building-mounted antennas at Plesetsk share a common calibration device, as do the two pedestal-mounted ones at Balaklava instrumentation site 1. The two building-mounted antennas at Nenoksa are also close to each other; however, they have separate calibration devices. It is unclear whether the antennas operate in different ranges or the two calibration devices are redundant and were found to be unnecessary at later installations.

15. (S/WN) Finally, it has not been determined why there are three TT-EL-01 antennas at Balaklava, which supports popup testing of naval missiles, and only one at Tyuratam, which is the Soviet's largest test center.

IMAGERY

(S/WN) All applicable satellite imagery acquired from January 1980 through [redacted] was used in the preparation of this report. 25X1

RELATED DOCUMENTS

NPIC. Z-20147/81, IAR-0160/81, *TT-EL-01 Probable Telemetry Antenna, USSR (S)*, Sep 81 (SECRET/ [redacted] 25X1

NPIC. Z-14548/82, IAR-0031/82, *Transportable TT-EL-01 Telemetry Antenna, USSR (S)*, Apr 82 (SECRET/ [redacted] 25X1

(S) Comments and queries regarding this report are welcome. They may be directed to [redacted] 25X1
Soviet Strategic Forces Division, Imagery Exploitation Group, NPIC, [redacted] 25X1

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